INSTRUCTION BOOK

FOR

DISA MARINETTA

Lifeboat Portable Radiotelegraph Equipment

DISA ELEKTRONIK
(Electronic Division of Dansk Industri Syndikat)
Copenhagen, Denmark

DISA MARINETTA

The DISA lifeboat portable transmitter-receiver has been developed to answer the recent international laws and regulations: International Convention for Safety of Life at Sea 1948 and Atlantic City Radio Regulations.

Description.

1. Application:

DISA MARINETTA provides two-way radiotelegraph communication. It also provides one-way AUTOMATIC radiotelegraph transmission for use by unskilled personnel. With AUTOMATIC operation, alarm signals, SOS signals and "long dashes" are transmitted. The "long dashes" enable ship and shore direction finders to take radio bearings for determining the position of the lifeboat.

2. Construction:

The DISA portable lifeboat transmitter-receiver is easily portable, easy to operate, and dependable in operation. All equipment prescribed is housed in one container, which is watertight, floatable, and easily distinguishable by its yellow colour. The equipment is securely packed in the container, so that this will withstand rugged treatment. The container is easily and quickly opened.

MARINETTA	Type: 71A10	Type: 71A11
Dimensions:	Height: 450 mm	575 mm
	Diameter: 350 mm	350 mm
	Weight complete: 19 kg.	20 kg.

The container houses the following parts:

A: Transmitter and receiver built in one unit with a hand-driven power supply and an automatic keying device. The equipment is watertight and has straps for securing it to a thwart or between the operator's legs.

B: Headphones with sound-isolating rubber rings. The headphones are permanently connected to the receiver.

C: Water connection (earth connection) with sinker. Permanently connected to the chassis of the equipment.

D: Antenna, with insulators and attachment grip, coiled up in the container cover, for fastening to a mast appr. 6 meters in height.

E: Artificial antenna for testing the equipment at regular intervals.

F: Instructions for automatic transmission of distress signals and for transmission and reception of radiotelegraphic communication, antenna erection etc. are leashed to the equipment.

Type: 71A11 is besides equipped with:

G: Antenna reel rotatably mounted on the front panel of the equipment, with antenna to be supported by a kite or a balloon.

H: Collapsible box-type kite.

3. Technical Specifications:

Transmitter:

2 fixed frequencies (international distress frequencies):

	500 kc/s	and 8364 kc/s
Frequency tolerances better than:	0.1%	0.02%
Power output delivered to mast-supported antenna appr.	2.5 W	4.0 W
Power output delivered to long antenna, appr.	4.5 W	4.0 W
Class of emission.	A 2	A 2
Modulation frequency, appr.	700 c/s	700 c/s
Depth of modulation, appr.	70%	70%
Power input.	10 - 12 W	10 - 12 W

The transmitter is provided with antenna tuning control for both frequencies and a common tuning indicator (neon lamp).

Receiver:

2 Frequency ranges	: 490-510 kc/s	8265-8765 kc/s
Tuning is	: fixed	variable
Sensitivity for 1 mW in headphones better than	: 100 µV	50 µV
Receives these types of emission	: A 2	A 1 and A 2

Power Supply:

Hand-driven generator provided with automatic voltageregulator and indicator for correct number of revolutions per minute. Crank freewheels when rotated in wrong direction.

Output with key depressed: 330 V/50 mA and 29 v/150 mA.
Output during reception: 330 V/20 mA and 29 V/200 mA.

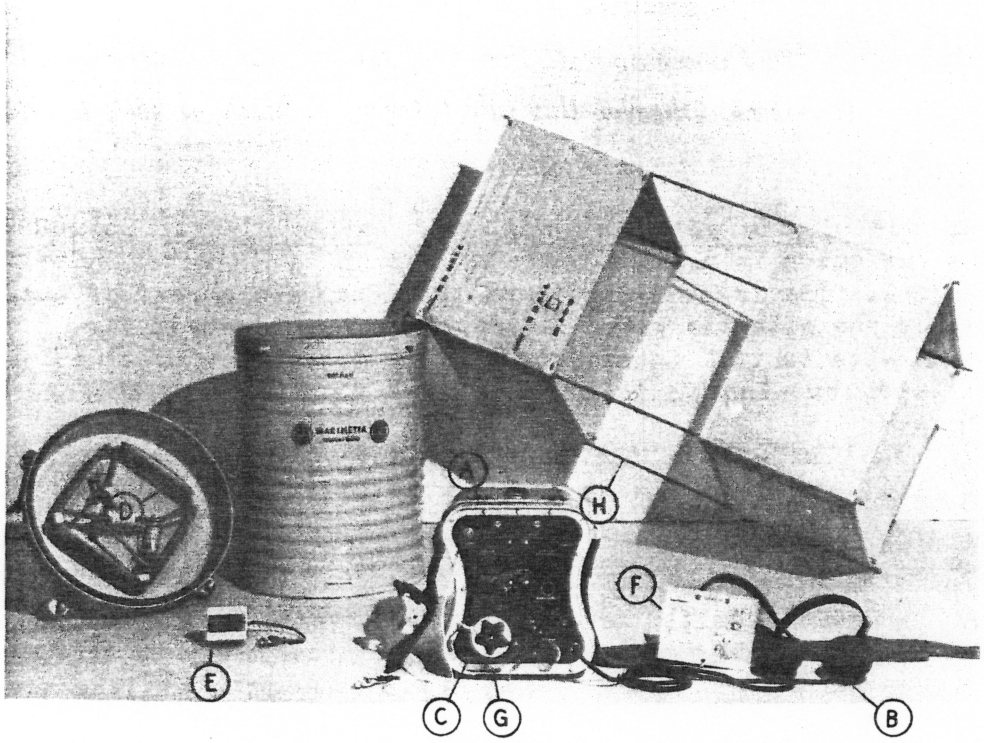

Fig. 1.

Automatic keying device:

Integral with hand-driven generator, but has independent speed control. The keying device sees that transmitter, when set at "TRANSMIT AUTOMATIC", sends the following signals at the frequency selected:

Alarm Signal:	12 dashes of 4 seconds each, with 1 second's interval.
Distress Signal:	4 times SOS.
Direction-finding Signal:	2 dashes of appr. 24 seconds each.

Total duration of above transmission is 2 minutes. The transmission is repeated as long as the generator is cranked and the equipment is set at "TRANSMIT AUTOMATIC".

4. How to Secure Best Results.

a) Become familiar with the equipment by reading this instruction book.

b) Use, if possible, the long (kite-supported) antenna and use the entire length.

c) Keep antenna wire free and clear of mast, sail etc.

d) International law provides for ships' radio operators to maintain a watch on the distress frequency of 500 kc/s, during 3 minutes after the quarter hour and three-quarter-hour: that is, from 15 to 18 minutes and from 45 to 48 minutes after the hour. Probability of interception, therefore, will be greatly increased if transmission is conducted during these intervals on the frequency 500 kc/s.

Operating Instructions.

SAFETY NOTICE: Do not operate the radio set or raise the antenna during severe electrical storms. Observe this rule to prevent death or serious injury.

5. Installation:

1) Raise one of the antennas high and in the clear. Coiled up inside container cover is a short heavy antenna to be supported by mast as shown in Fig. 2. The transmitter front panel carries a reel of small antenna wire for use with the kite. Assemble kite as shown in Fig. 3 and fasten antenna wire to it. Loosen nut holding the antenna reel to permit reel to rotate, but loosen it only so much that a certain brake action is exercised.
NOTE: MARINETTA Type 71A10 is provided with mast antenna only while Type 71A11 has also a kite and a kite antenna.

2) Strap equipment to thwart or between legs.

A belt assembly permits the radio to be strapped to a thwart as shown in Fig. 4. If this is impracticable, the equipment may be strapped between the operator's legs. The operator will assume a sitting position and strap the unit between the legs just above the knees, with the front panel away from him.

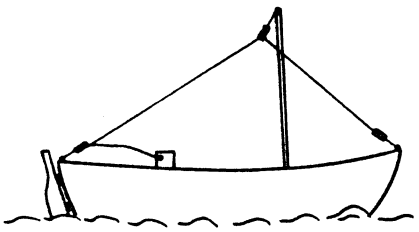

Fig. 2.

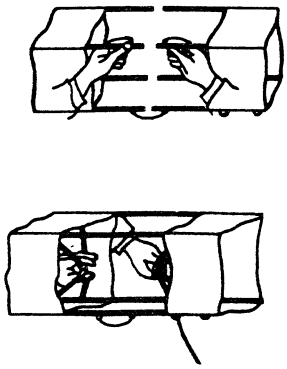

Fig. 3.

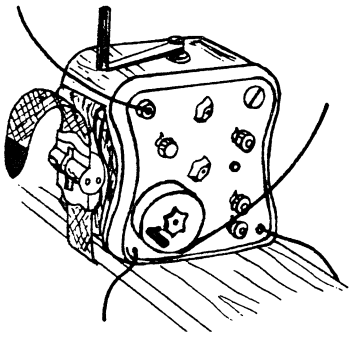

Fig. 4.

3) Connect yellow antenna lead-in to antenna.

A yellow insulated lead, fitted with a clip, is permanently attached to the antenna terminal of the equipment. Fasten this clip to the end of the antenna used.

4) Place ground wire in water.

Unwind flexible ground wire and place the end with sinker attached in the water. This is the "ground" connection.

5) Mount crank.

In the well on the back of the transmitter is the Hand Crank. It is affixed to the case by a leash and is made available by removal of the locking pin.

The leash is long enough to enable the crank to reach the socket and must not be broken. Insert the crank into its socket and tighten the thumb screw.

6. Operation:

To transmit automatic distress signals, consisting of: Alarm signals, SOS signals, and "long dashes" for direction finders, follow instructions below (also leashed to transmitter).

Automatic Distress Signals.

Set (1) at TRANSMIT AUTOMATIC, and (2) at 500 kc/s. Crank generator so that SPEED INDICATOR lights and adjust (3) for maximum brilliance of TUNE INDICATOR.

Set (2) at 8364 kc/s. Crank generator so that SPEED INDICATOR lights and adjust (4) for maximum brilliance of TUNE INDICATOR. TUNE INDICATOR will flash on and off in time with signals.

Continue cranking generator so that SPEED INDICATOR lights.

Alternate regularly between 500 kc/s and 8364 kc/s by changing position of (2).

Manual Two-way Operation.

This condition is for use by the radio operator. The procedure is as follows:

First set controls as prescribed above.

Transmit: Set (1) at TRANSMIT MANUAL and (2) at the desired frequency. Crank generator so that SPEED INDICATOR lights, and transmit signals with MORSE KEY.

Receive: Set (1) at RECEIVE and (2) at the desired frequency. If (2) it set at 8364 kc/s the frequency is selected with (5).

The volume is adjusted with (6).

NB: TUNE INDICATOR is so devised that the functioning of the transmitter will not be affected by any faults that might occur in the Indicator. If the TUNE INDICATOR does not function, set CONTROL (4), 8364 kc/s ANTENNA TUNING, with arrow in approximately mid-scale position, and adjust control (3), 500 kc/s ANTENNA TUNING, for maximum loading as indicated by greatest physical resistance to cranking.

Keep in mind that warm-up time for the transmitting tubes is approximately 30 seconds.

Mode of Operation.

7. Transmitter Section.

(Refer to Schematic Diagram).

The transmitter has two stages, oscillator and power amplifier. The oscillator tube V_6 is a twin triode each section of which is tuned to its separate frequency. This greatly simplifies frequency changing, which is accomplished by shifting the plate voltage from one triode section to the other, by means of switch C2. The triode section operating on 500 kc/s uses a Colpitts circuit the frequency-determining portion of which consists of capacitors C 40, C41 and the coil L6, whose iron core is set for operation on 500 kc/s. The RF voltage is passed from the plate of the tube via C43 and the choke HFD2 on to the grid of the power amplifier tube. The choke is inactive at the said frequency.
The other triode section operates as a Pierce-type crystal oscillator. The crystal is ground to the transmitting frequency, 8364 kc/s. The plate circuit, consisting of capacitor C38 and coil L5, is tuned to a slightly lower frequency; it aids in increasing the amplitude of the RF oscillator and secures properly shaped keying of the crystal oscillator. Capacitor C39 conveys the RF voltage from the plate of the oscillator tube to the grid of the power amplifier tube. The choke HFD2 prevents the 8364-kc signal from being by-passed to chassis through the 500-kc circuit.

The oscillator tube is blocked when the key is open; this is accomplished by means of a positive potential applied to the cathode. The potential develops across the resistor R29, due to the current flowing through the power amplifier tube. The resistor is short-circuited when the transmitter is keyed; either, when the transmitter is set at "TRANSMIT MANUAL" by means of the morse key; or, when the equipment is set at "TRANSMIT AUTOMATIC", by means of a pair of contacts on the automatic keyer.

V_7, the power amplifier tube, is a pentode. From its plate, the amplified RF voltages are applied, via capacitor C47, to the tank circuit. The latter is so wired as to provide resonance at both 8364 kc/s and 500 kc/s without switching. Capacitors C49 and C51 and the coil L7 form the output circuit for 8364 kc/s. The voltage across capacitor C51 is applied to the antenna via switches O1 and O2. This provides a match between the output circuit and any antenna whose length is either one quarter wavelength (appr. 9 meters) or an odd multiple of a quarter wavelength, and the antennas supplied with the equipment have been dimensioned accordingly. C49 has been made variable and is adjusted, by means of the control (4) "8364 kc/s ANTENNA TUNING", for maximum voltage as indicated by maximum brilliance of the "TUNE INDICATOR", which is coupled to the circuit across switch O2 and capacitor C48. This cancels out such inaccuracies in the effective antenna length as may be caused by the different ways of supporting the antenna that may be used in lifeboats.
At 500 kc/s, capacitor C51 and the coil L8 act as a fixed-tuned plate circuit for the power amplifier tube. The voltage across the coil L9 is fed to the antenna via the variometer L10. The antenna circuit is tuned, by means of the control (3) "500 kc/s ANTENNA TUNING", to maximum voltage on the antenna as indicated by maximum brilliance of the "TUNE INDICATOR".

The signal delivered by the transmitter is appr. 70% amplitude modulated with an audio frequency of appr. 700 cycles. The audio voltage required is generated by tube V5, a twin triode only one section of which is active. When the equipment is set at "TRANSMIT AUTOMATIC" or "TRANSMIT MANUAL", the grid of this tube is connected, through a pair of contacts on O1, to the primary of transformer T4, and then functions as audio oscillator; from the plate of V5, the generated audio voltage is applied via capacitor C33 to the grid of the amplifier tube, amplitude modulating the RF signal.

When the switch O1 is set at "Receive" filament voltage remains on the transmitting tubes, and the transmitter is ready for immediate use. The audio tube V5 then functions as receiver output tube, R37 acts as grid leak, and the headphones are connected to the plate via C33, transformer T4 acting as plate choke from across which the amplified signals are applied to the headphones. Moreover, a pair of contacts on switch O1 short-circuit the oscillator tube's cathode resistor R29, and if switch O2 is set at "8364 kc/s CW" reduced plate voltage is applied to the 500-kc oscillator through resistor R39, and the tube generates a weak 500-kc/s signal which combines with the intermediate frequency of the receiver to permit reception of CW signals (beat-note reception).

8. Receiver Section.

(Refer to Schematic Diagram).

When set at 500 kc/s, the receiver functions as T.R.F. receiver, tubes V1 and V2 acting as RF amplifiers and V3 as detector and audio amplifier. RF transformers T1, T2, T3 are coupled for ±10 kc bandwidth at this frequency so that the receiver will respond equally well to all signals between 490 and 510 kc/s. The receiver responds only to modulated signals (m.c.w.).

When set at 8364 kc/s, the receiver operates on the superheterodyne principle, V1 serving as converter, V2 as IF tube, and V3 as detector and audio tube. The oscillator frequency is higher than the signal frequency by 500 kc/s so that the resulting intermediate frequency is 500 kc/s. RF transformers T2 and T3 function as conventional IF transformers. The gang tuning capacitor C5, C9, provided with a calibrated dial on the front panel, permits tuning the receiver to frequencies between appr. 8.2 and 8.8 Mc/s. When set at "8364 kc/s MCW", the receiver responds to modulated signals only, while CW signals, too, may be received with the switch in position "8364 kc/s, CW". In this case the 500 kc-oscillator of the transmitter (refer to description of transmitter section) is in operation, injecting a signal into the receiver IF channel to produce an audible beat note.

Throwing the switch from "500 kc/s" to "8364 kc/s, CW" or "8364 kc/s MCW" removes the short-circuit across the oscillator tank circuit, consisting of capacitors C9, C10 and coil L3, and the tube's grid bias, hitherto determined by the difference in potential between the filament and the chassis, is now determined by the flow of grid current through resistor R3 with the filament voltage as reference potential. The flow of grid current is due to the fact that the tube now acts as oscillator, G1 serving as control grid and G2 as plate. RF transformer T1 is short-circuited, and 500-kc signals can no longer reach the receiver.

The sensitivity of the receiver and hence the volume is adjustable with potentiometer R10, which adjusts the screen voltage and hence the gain of tube V2.

The neon tube V4 stabilizes the plate and screen voltages for tube V1 at 85 volts. The plate voltages of the other tubes, too, are reduced to approximately that voltage by the voltage divider consisting of resistors R17 and R18. Capacitors C26 and 27 serve as filters for respectively the plate and filament voltages of the receiver.

9. Power Supply Section and Automatic Keying Mechanism.

(Refer to schematic Diagram).

The equipment is powered by a hand-driven generator. The crank, which freewheels if rotated in the wrong direction, requires a speed of appr. 80 r.p.m. The gear train gives the generator a rotational speed of appr. 5000 r.p.m. The voltages supplied (appr. 30 volts for the filaments of the tubes, and appr. 330 volts for the plate) are kept constant even if the rotational speed drops as much as 20 per cent. below the rated speed, and are prevented from rising to higher values at higher speeds by the voltage-regulating relay, which functions as follows. When the relay is in its no-load position, the relay contacts connect the field coil of generator to the 30-volt potential of the generator, and the current set up by that potential in the field coil determines the magnetic field strength of the generator and hence, together with the generator's rotational speed, the voltage supplied. However, the relay coil is connected to the 30-volt potential as well, and in case excessive rotational speeds cause this potential to exceed a certain value the said relay will attract its armature, breaking the connection between the field coil and the power source and coupling in a pair of lamps as ballast for the 30-volt supply. This causes the voltage to drop rapidly to the value at which the relay releases the armature, and the field coil then functions again. One ballast lamp is mounted visibly and is marked SPEED INDICATOR; it indicates, when lighting, that the voltage regulator is active and that the proper rotational speed has been reached. The generator is equipped with noisereducing capacitors. The keying mechanism is driven, through a special gear train and a friction drive, by the crank. A centrifugal governor and the friction drive ensure constant rotational speed. The contacts of the keying mechanism are controlled by 3 different cams: when the equipment is set at "TRANSMIT AUTOMATIC" these contacts key the transmitter in this sequence: Cam No. 1, $\frac{1}{2}$ r.p.m., for 1 minute keeps the contacts of the cam No.2 in operation; cam No.2, 12 r.p.m., transmits 12 dashes of 4 seconds each, spaced by 1-second intervals (the alarm signal), then cam No. 1 breaks all its contacts for 10 seconds, and cam No. 3, 12 r.p.m., therefore transmits with its contacts a total of 4 times SOS through the said 10 seconds (the distress signal). Next, cam No.1 closes all its contacts and transmits 2 long dashes of appr. 24 seconds each, whereupon it again breaks its upper contact, coupling in cam No. 2.

Maintenance.

10. Regular Tests and Inspection of Equipment.

For these tests an artificial antenna is provided in the container. The equipment will cause no interference when tested with the artificial antenna. The procedure is a follows:

Set up equipment as described in Operating Instructions. Connect yellow antenna lead-in to artificial-antenna terminal marked "ANT". Connect lead from other terminal of artificial antenna to ground wire of equipment, as close to the transmitter as possible. Now operate equipment as explained

in Operating Instructions; check that the tuning indicator lights, which is an indication of the proper functioning of the transmitter and the automatic keying machanism. Also, if the test is carried out in the radio room the signals generated may be monitored in the station receiver.

NB: TUNE INDICATOR is so devised that the functioning of the transmitter will not be affected by any faults that might occur in the Indicator. If the TUNE INDICATOR does not function, set Control (4), 8364 kc/s ANTENNA TUNING, with arrow in approximately mid-scale position, and adjust control (3), 500 kc/s ANTENNA TUNING, for maximum loading as indicated by greatest physical resistance to cranking.

Keep in mind that warm-up time for the transmitting tubes is approximately 30 seconds.

The receiver may be checked by merely removing the yellow antenna lead-in from the artificial antenna, and sufficient signals can then be received practically at any time.

The following checks should be made at frequent intervals: Remove, using a screwdriver or similar tool, the equipment's dryer, which is located under the screw-cap. The dryer consists of silica gel, which becomes pink on absorbing moisture. If the colour is pink, place dryer on a radiator or in some other warm place until the powder reassumes its original bluish colour, indicating dryness. Then replace dryer and tighten screw carefully.

All shaft holes are provided with watertight neoprene glands and may be lubricated with oil or grease, so if the controls "tune hard" a drop of oil etc. will help.
Also the crank bearing should be kept well greased, and the crank proper may also be lubricated.

Normally, only such points should be lubricated as are accessible without disassembling the equipment.

Inside parts require no lubrication. Never lubricate the friction disc and centrifugal governor of the automatic keying machanism.

When packing equipment in container make sure that all four hold-down bolts are properly tigthened, and that the lowering line is properly attached and in good condition.

11. Service Instructions.

SAFETY NOTICE: Voltages as high as 300 volts are used in the operation of this equipment. These voltages are dangerous to life.

If, in making the tests specified in the foregoing section, incorrect functioning is observed, the fault must be located and if possible corrected immediately. For this, a few common hand tools and a service instrument are required.

Read the section on Mode of Operation and become familiar with the schematic diagram attached.

Before disassembling the equipment, attempt to locate the trouble as accurately as possible. With the artificial antenna connected, operate the equipment according to the Operating Instructions, check all functions and note which of them are faulty. Use the schematic diagrams to establish the probable location of the fault(s), and then disassemble the equipment. Remove all screws along the edge of the front panel. Then draw the transmitter and receiver section, which are fastened to the front panel, half-way out of the housing Fig. 5. Next remove the lead to the "TUNE INDICATOR"and pull out the multiwire connector from the receptacle. Now the front panel with all the units on it may be entirely removed from the housing and the power supply unit.

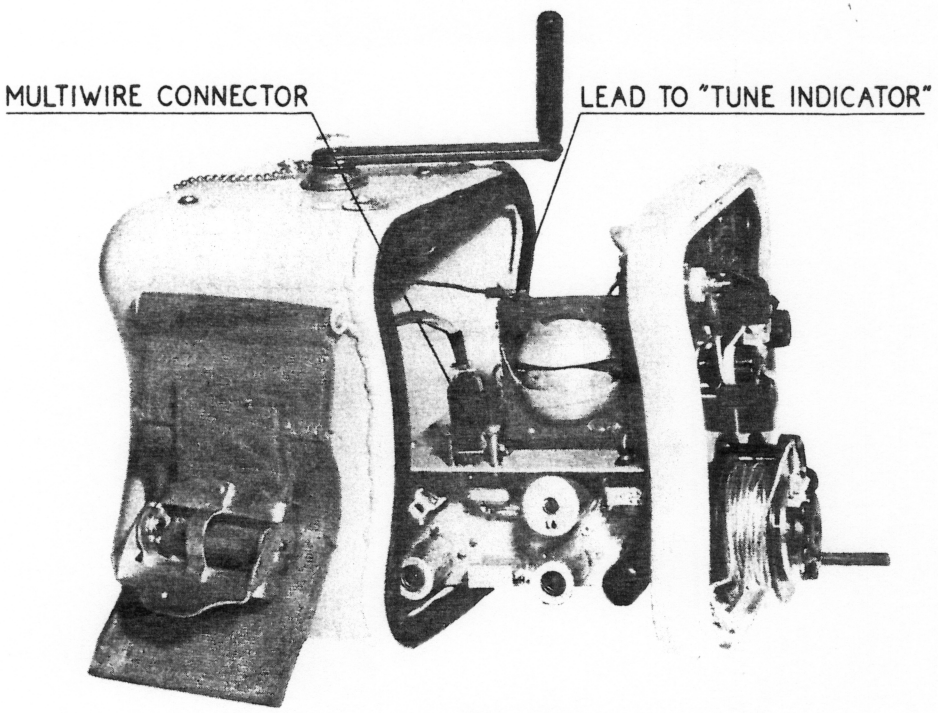

Fig. 5.

All tubes and points of alignment are then accessible.

Do not attempt to re-align the equipment without possessing the necessary knowledge and measuring equipment. All iron cores have been correctly set at the factory, and have been secured against working loose.

Check the tube filaments with a multimeter (ohm measurement). Replace defective tubes, if any.

If the fault cannot be located in this manner, remove receiver section from its place, thus making accessible all components and points of measurements. To remove receiver section, remove all its knobs and loosen 4 screws marked in red (2 into the front panel and 2 at the rear edge of the chassis).

The transmitter section may be connected to the power supply by plugging in the multiwire connector. To make checks on the receiver, connect it to the power supply by running leads between identically numbered terminals of the receiver-section and the transmitter-section multiwire connectors.

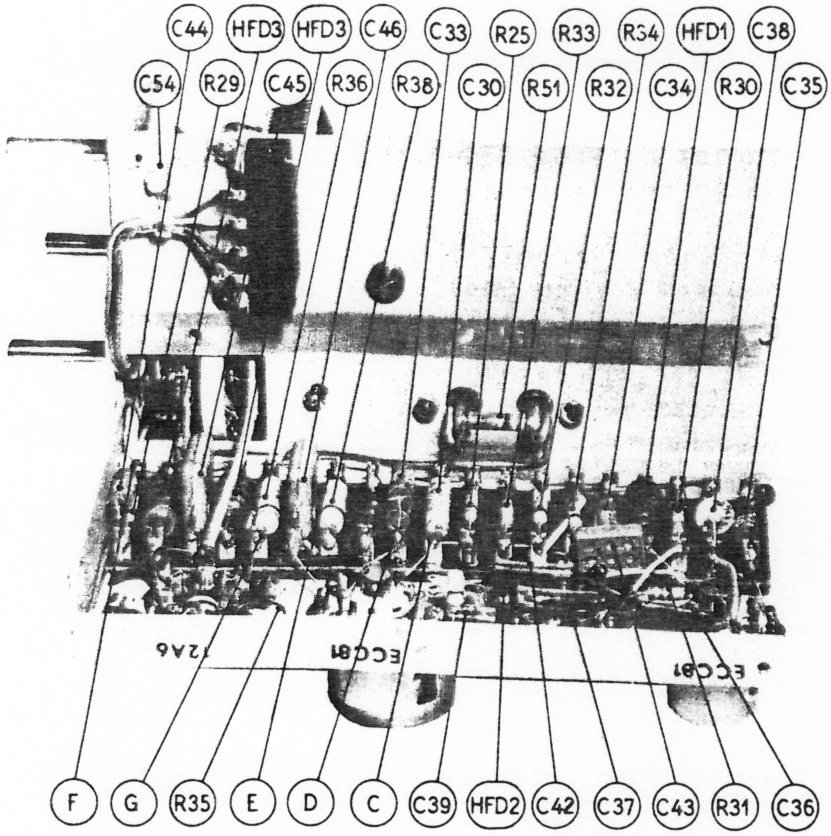
C44
HFD3
HFD3
C46
C33
R25
R33
R34
HFD1
C38
C54
R29
C45
R36
R38
C30
R51
R32
C34
R30
C35
F
G
R35
E
D
C
C39
HFD2
C42
C37
C43
R31
C36

Fig. 6.

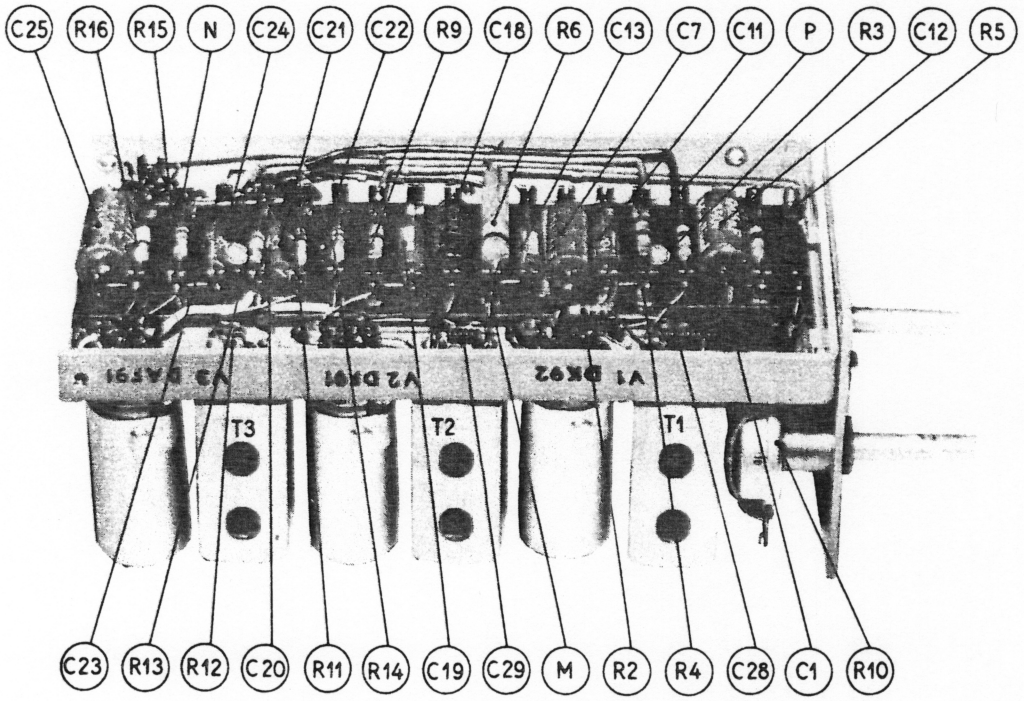
C25
R16
R15
N
C24
C21
C22
R9
C18
R6
C13
C7
C11
P
R3
C12
R5
T3
T2
T1
C23
R13
R12
C20
R11
R14
C19
C29
M
R2
R4
C28
C1
R10

Fig. 7.

Have somebody else crank the generator, and check, in the faulty section, the voltages specified in the schematic diagram. The voltages have been read with respect to the chassis on a multimeter having a resistance of appr. 1000 ohms per volt. Minor deviations from the values specified do not necessarily indicate any fault. The readings on the transmitter section have been made with the artificial antenna connected and with the transmitter keyed and correctly tuned to the antenna.

To measure the plate current through the power amplifier tube, set the measuring instrument at the 50 m.a. or 100 m.a. range, and connect it to measuring points A and B (+ to A). These measurements may be made:

Transmitter not keyed ..... 5 - 10 m.a.
Transmitter keyed, antenna not connected,[*].. 3 - 10 m.a.
Transmitter keyed, artificial antenna connected and transmitter tuned correctly ..... 25 - 35 m.a.

During the warm-up period the power amplifier tube will momentarily draw more current than stated above for Transmitter keyed. For the receiver section, the measuring voltage specified is for the equipment set at "500 kc/s" and "RECEIVE", and with the artificial antenna connected and the gain control full on. In this condition the receiver normally produces no noise, only a hissing sound.

When attaching the receiver section to the front panel be sure to mount the watertight shaft glands correctly - first place the pressure spring on the shaft, then the disc, and, on the outside, the rubber gland.

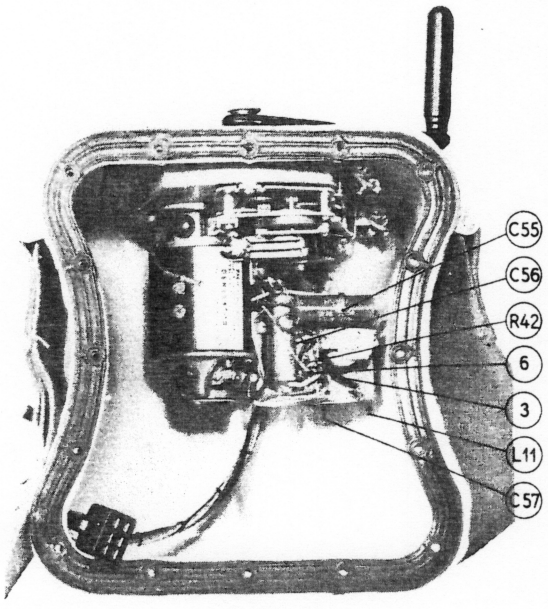

Fig. 8.

When placing equipment in the housing be sure to plug the multiwire connector into the power supply receptacle and to connect the lead to the TUNE INDICATOR when the equipment is halfway in the housing. Tighten carefully all screws holding the front panel to the housing as otherwise the equipment will not be watertight.

*["8364 kc/s ANTENNA TUNING" set to resonance (minimum plate current)]

PARTS LIST

MARINETTA 71A10, 71A11 and 71A12.

Reference Drawing 71A07

R1	1	Resistor		1 M ohm	½ W	Carbon	
R2	1	"		100 ohm	½ W	"	
R3	1	"		30 k ohm	½ W	"	
R4	1	"		200 k ohm	½ W	"	
R5	1	"		30 k ohm	½ W	"	
R6	1	"		30 k ohm	2 W	"	
R7	1	"		360 k ohm	½ W	"	
R8	1	"		200 k ohm	½ W	"	
R9	1	"		20 k ohm	½ W	"	
R10	1	"	Variable	100 k ohm		"	Miniature
R11	1	"		500 k ohm	½ W	"	
R12	1	"		150 k ohm	½ W	"	
R13	1	"		50 k ohm	½ W	"	
R14	1	"		1 M ohm	½ W	"	
R15	1	"		1 M ohm	½ W	"	
R16	1	"		4 M ohm	½ W	"	
R17	1	"		40 k ohm	6 W	Wire	
R18	1	"		10 k ohm	1 W	Carbon	
R19-24		Not used.					
R25	1	Resistor		1 k ohm	½ W	Carbon	
R26	1	"		200 k ohm	½ W	"	
R27	1	"		50 k ohm	½ W	"	
R28	1	"		100 ohm	½ W	"	
R29	1	"		5 k ohm	½ W	"	
R30	1	"		50 k ohm	½ W	"	
R31	1	"		100 ohm	½ W	"	
R32	1	"		30 k ohm	½ W	"	
R33	1	"		20 k ohm	½ W	"	
R34	1	"		30 k ohm	½ W	"	
R35	1	"		43 ohm	½ W	"	
R36	1	"		10 k ohm	1 W	"	
R37	1	"		2 M ohm	½ W	"	

R38	1	Resistor		20 k ohm	1 W	Carbon
R39	1	"		500 k ohm	½ W	"
R40	1	"		50 k ohm	½ W	"
R41	1	"		50 ohm	½ W	"
R42	1	"		1 k ohm	½ W	"
R43	1	"		33 ohm	3 W	"
C1	1	Condenser		15 pF	350 V W	Protect. Silv. Mica
C2	1	"		100 pF	350 V W	" " "
C3	1	"		100 pF	350 V W	" " "
C4	1	"		150 pF	350 V W	" " "
C5	1	"	Variable	30 pF	Ganged with C9	
C6	1	"		100 pF	350 V W	Ceramic
C7	1	"		0.1 µF	150 V W	Metal. Paper
C8	1	"		200 pF	350 V W	Ceramic
C9	1	"	Variable	30 pF	Ganged with C5	
C10	1	"		120 pF	350 V W	Protect. Silv. Mica.
C11	1	"		0.01 µF	350 V W	Metal. Paper.
C12	1	"		0.05 µF	350 V W	" "
C13	1	"		0.01 µF	350 V W	" "
C14	1	"		100 pF	350 V W	Protect. Silv. Mica.
C15	1	"		100 pF	350 V W	" " "
C16	1	"		100 pF	350 V W	" " "
C17	1	"		100 pF	350 V W	" " "
C18	1	"		0.1 µF	150 V W	Metal. Paper.
C19	1	"		0.01 µF	350 V W	" "
C20	1	"		0.01 µF	350 V W	" "
C21	1	"		200 pF	350 V W	Ceramic
C22	1	"		200 pF	350 V W	"
C23	1	"		0.01 µF	350 V W	Metal. Paper
C24	1	"		100 pF	350 V W	Ceramic
C25	1	"		0.05 µF	350 V W	Metal. Paper
C26	1	"	2x	12.5 µF	500 V W	Electrolytic
C27	1	"		25 µF	50 V W	"
C28	1	"		2.6 pF	350 V W	Ceramic
C29	1	"		2.6 pF	350 V W	"
C30	1	"		5 µF	25 V W	Electrolytic

C31	1	Condenser	3000 pF	500 V W	Molded Mica
C32	1	"	0.01 µF	350 V W	Metal Paper
C33	2	"	0.01 µF	350 V W	" "
C34	1	"	0.01 µF	350 V W	" "
C35	1	"	0.01 µF	350 V W	" "
C36	1	"	100 pF	350 V W	Protect. Silv. Mica.
C37	1	"	200 pF	350 V W	Ceramic
C38	1	"	20 pF	700 V W	"
C39	1	"	50 pF	350 V W	"
C40	1	"	4000 pF	500 V W	Molded Mica
C41	2	"	4000 pF	500 V W	" "
C42	1	"	200 pF	350 V W	Ceramic
C43	1	"	500 pF	500 V W	Molded Mica
C44	1	"	0.01 µF	350 V W	Metal Paper
C45	1	"	3000 pF	500 V W	Molded Mica
C46	1	"	3000 pF	500 V W	" "
C47	1	"	1000 pF	500 V W	" "
C48	1	"	10 pF	700 V W	Ceramic
C49	1	" Variable	20 pF		
C50	1	"	15 pF	700 V W	Ceramic
C51	1	"	400 pF	500 V W	Molded Mica
C52	1	"	15 pF	700 V W	Ceramic
C53	1	"	0.01 µF	350 V W	Metal Paper
C54	1	"	5000 pF	350 V W	" "
C55	1	"	2 µF	150 V W	" "
C56	1	"	0.1 µF	500 V W	Oil Paper
C57	1	"	8 µF	450 V W	Electrolytic
C58	2	"	700 pF	500 V W	Molded Mica

L1.2	1	Coil	Aerial	5 + 12 Turns 0.6 mm E
L3.4	1	"	Oscillator	11.5 Turns 0.6 mm E
				11 Turns 0.2 mm E
L5	1	"	8364 kc/s Osc.	36 Turns 0.4 mm E
L6	1	"	500 kc/s Osc.	60 Turns 20 x 0.05 Litz 50 µHy
L7	1	"	8364 kc/s PA	29 Turns 0.6 mm E
L8.9	1	"	500 kc/s PA	84 Turn 120 x 0.05 Litz 360 µHy
			500 kc/s Coupl.	15 Turn 120 x 0.05 Litz

L10	1	Coil	Variable	200 Turn 120 x 0,05 Litz
L11	1	"	Noise Suppressor	75 Turn 0,3 E + S 70 µHy
T1	1	500 kc/s	RF-Transformer	Miniature
T2	1	" "	"	"
T3	1	" "	"	"
T4	1	LF-Transformer	Prim. 700 ohm DC	Sec. 17 ohm DC
D1	1	LF - Choke	10 Hy	500 ohm 50 mA
HFD1	1	RF - Choke	2,5 mHy	Iron Cored Miniature
HFD2	1	" "	250 µHy	" " "
HFD3	2	" "	2,5 mHy	" " "
X1	1	Crystal	8364 kc/s ± 0,01 %	2,3 mm Pins, Spaced ½"

V1	1	Tube	DK92	Europe
			1AC6	U.S.A.
V2	1	"	DF91	Europe
			1T4	U.S.A.
V3	1	"	DAF91	Europe
			1S5	U.S.A.
V4	1	"	85A2	Europe
			5651	U.S.A.
V5	1	"	ECC81	Europe
			12AT7	U.S.A.
V6	1	"	ECC81	Europe
			12AT7	U.S.A.
V7	1	"	12A6	Europe
			12A6	U.S.A.
V8	1	Neon Indicator	NT2	Europe
			NE2	U.S.A.
V9	2	Lamps Bayonet	24 V 3 W	Europe
			28 V 0,1 Amp.	U.S.A.

SENDER TRANSMITTER

ECC 81 = 12AT7

12 A6

AFSTEM. INDIKATOR TUNE INDICATOR

8364 kc/s ANTENNEAFST. ANTENNA TUNING

500kc/s ANTENNEAFST. ANTENNA TUNING

ANT

ARTIFICIAL ANTENNA
KUNSTIG ANTENNE

SENDE AUTOMATISK
TRANSMIT AUTM.

SENDE MANUEL
TRANSMIT MANUAL

MODTAGE
RECEIVE

MORSENØGLE
KEY

HOVEDTELEFON
HEADPHONE

8364kc/s CW

8364kc/s MCW

500kc/s

MODTAGER RECEIVER

STRØMFORS. POWER SUPPLY

SPEED INDICATOR
FARTINDIKATOR

RELAY

FIELD COIL
MAGNETSPOLE

GENERATOR

GEAR

KEYING DEVICE
TEGNGIVER

SOS

ALARM

2 MIN
½ RPM

5 SEC
12 RPM

STYRKE VOLUME

DK92
1AC6

DF91
1T4

DAF91
1S5

85A2
5651

SCHEMATIC DIAGRAM 71A07